



## ***Polar RS800sd***

***A complete training system  
for runners and endurance athletes***

- 2 Polar RS800 Training System
- 3 RS800 Wrist Unit
- 4 Polar s3 stride sensor™ W.I.N.D. (option)
- 5 Polar WearLink® W.I.N.D. Transmitter
- 6 Polar ProTrainer 5™ Software for Windows
- 7 Optimising training effect with the RS800
- 8 **Plan** – Train – Analyse:  
Using the Polar RS800 training system
- 9 Plan – **Train** – Analyse:  
Using the Polar RS800 training system
- 10-11 Plan – Train – **Analyse:**  
Using the Polar RS800 training system
- 12 Detecting training effect by Measuring Heart Rate Variability –  
R-R Recording
- 13 Polar OwnZone®
- 14 Polar OwnOptimizer™
- 15 Running Index
- 16 Running Cadence and Stride Length
- 17 Polar sport zones



## ***Polar RS800 Training System***

From the very first commercial heart rate monitor launched in 1981, Polar has travelled hand in hand with world class athletes, continually evolving and innovating sports training aids to elevate individual performance to levels that previously seemed unattainable.

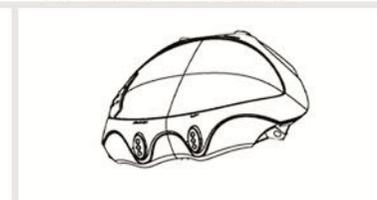
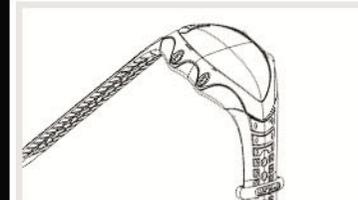
### **The next generation of running / training computers**

Polar's RS range is the culmination of 30 years research and development to deliver the most complete and effective heart rate monitor based training management system for recreational runners, competitive runners and endurance athletes.

### **A complete training system that is as indispensable as your running shoes.**

The RS800 has been designed for serious endurance athletes and competition runners. The system provides an unprecedented amount of feedback on body performance and enables the planning, tracking and analysis of training to an exacting level never before realized.





Design

Display

Battery

Ergonomically moulded for maximum comfort and usability.

Scratch resistant lens with magnification. Large 3 row LCD.

User changeable, CR2032, 3volt.

## RS800 Wrist Unit

Using interference free Polar W.I.N.D. (Wireless Integrated Network Device) technology, RS800 communicates with the Polar WearLink® transmitter W.I.N.D. and Polar s3 stride sensor™ W.I.N.D. over a wireless 2.4GHz frequency. Wearlink sends 1ms resolution ECG data to the wrist unit and, tracking the position of the foot 1000 times a second, the s3 stride sensor (option) sends speed, distance and cadence data.

Combining data received from WearLink and the s3 stride sensor with time and altitude, RS800 measures:

- Heart Rate (min, max and average)
- Beat to beat variation
- Pace / Speed (max and average) <sup>1</sup>
- Distance <sup>1</sup>
- Running cadence (max and average) <sup>1</sup>
- Average stride length <sup>1</sup>
- Calorie consumption
- Changes in altitude
- Total training time
- Time spent in training intensity zones (Polar sport zones)
- Running index (running performance level quantification)

<sup>1</sup> Optional s3 stride sensor is required.

## RS800 Wrist Unit Technical Specifications

<b>Watch functions:</b>	Time 1 & 2, Date, Alarm, Reminder, Event Countdown.
<b>Heart rate measuring range:</b>	15–240BPM
<b>Current speed display range:</b>	Stride sensor: 0–36km/h or 0–22,3mph
<b>Altitude display range:</b>	-550m ... +9000m / -1800ft ... +29500ft
<b>Ascent resolution:</b>	5m / 20ft
<b>Memory size:</b>	1Mb /99 files
<b>Connectivity:</b>	IrDA and Polar W.I.N.D. 2.4GHz Wireless
<b>User interface Language:</b>	English, French, German and Spanish
<b>Battery type life:</b>	User changeable, CR2032
<b>Battery life:</b>	Avg. 1 year (1h/day)
<b>Battery sealing ring:</b>	Silicon O-Ring, 20.0 x 1.1
<b>Operating temperature:</b>	-10°C to +50°C / 14°F to 122°F
<b>Wrist band and buckle material:</b>	Polyurethane, stainless steel
<b>Back cover:</b>	Polyamide, stainless steel
<b>Weight:</b>	46g
<b>Water Resistance:</b>	50m / 5Bar pressure



### ***Polar s3 Stride Sensor™ W.I.N.D. (option)***

Going beyond speed and distance to provide insight into the running stride itself, the s3 stride sensor is a durable light-weight module that measures just 55 x 39 x 14mm. It can be mounted securely and unobtrusively to training shoe laces or placed inside the specially designed mid-sole cavity in the adidas Fusion running shoe.

The s3 stride sensor is activated automatically by the RS800 wrist unit at the beginning of a training session and transmits speed, distance and cadence data to the RS800 wrist unit using Polar W.I.N.D. 2.4GHz wireless transmission technology.

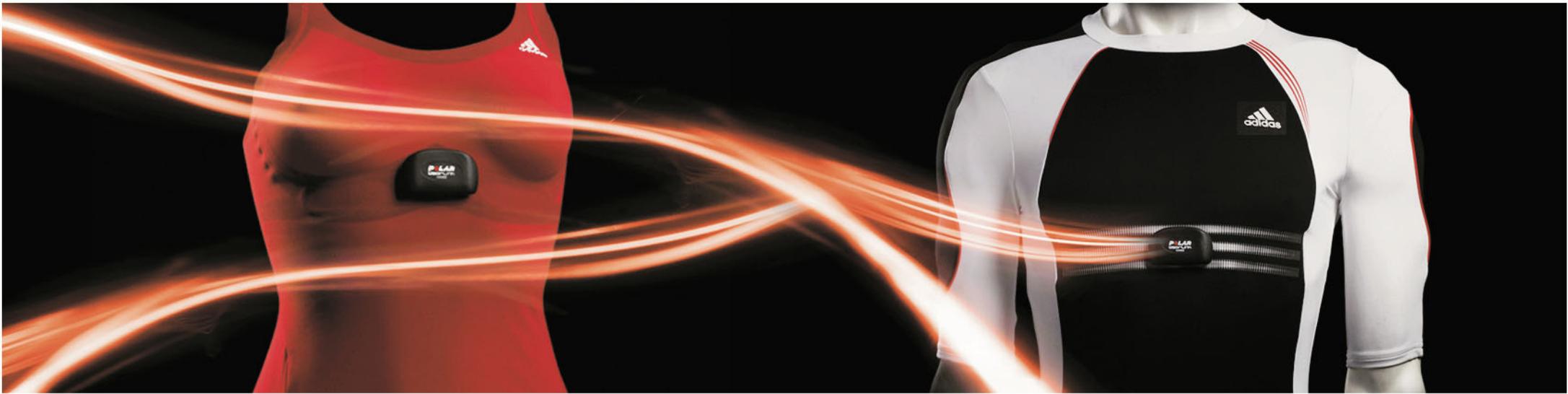
The s3 stride sensor has user changeable battery with a minimum lifetime of 50 hours during normal use. Remaining battery life can be checked remotely with the Polar ProTrainer 5™ PC software. Low battery warnings will also be displayed on the RS800 wrist unit.

Polar s3 stride sensor is the most effective technology for tracking real-time pace, distance and cadence.

### ***s3 Stride Sensor Specifications:***



<b>Connectivity:</b>	Polar W.I.N.D. 2.4GHz Wireless
<b>Casing Dimensions:</b>	55 x 39 x 14mm
<b>Casing Materials:</b>	Composite polycarbonate
<b>Weight:</b>	21g
<b>Water Resistance:</b>	To 50M / 5Bar pressure
<b>Battery type:</b>	User changeable, CR2430
<b>Battery life:</b>	Average 50 hours of use
<b>Battery sealing ring:</b>	Silicon O-Ring, 25.0 x 1.2
<b>Operating temperature:</b>	-10°C to +50°C / 14°F to 122°F
<b>Accuracy:</b>	+/- 1 to 3% or better once calibrated



## **Polar WearLink® W.I.N.D. Transmitter**

Since pioneering the development of wireless heart rate sensors, Polar has consistently led the field in furthering the technology to improve resolution and eliminate interference. The WearLink W.I.N.D. transmitter and soft textile chest strap is the latest generation of Polar's proprietary heart rate sensing and transmission technology. The transmitter is also fully compatible with adidas Fusion apparel.

Measuring every beat of the heart with 1 millisecond resolution, WearLink sends beats per minute and beat to beat variability information to the RS800 wrist computer for analysis.

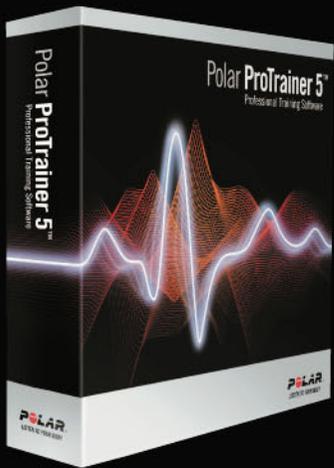
Polar W.I.N.D. transmission technology uses a robust 2.4GHz frequency for longer range transmission and to eliminate interference from external influences such as power lines etc.

## **WearLink Specifications:**



Polar Wearlink W.I.N.D. is the world's only soft textile transmitter.

<b>Connectivity:</b>	Polar W.I.N.D. 2.4GHz Wireless
<b>Battery type:</b>	User changeable, CR2025
<b>Battery life:</b>	Avg. 2 years (3h/day)
<b>Battery sealing ring:</b>	O-ring 20.0 x 1.0, material silicone
<b>Operating temperature:</b>	-10°C to +40°C / 14°F to 104°F
<b>Connector material:</b>	Polyamide
<b>Weight:</b>	23g
<b>Strap material:</b>	Polyurethane/ Polyamide/ Polyester/ Elastane/ Nylon



# Polar ProTrainer 5™

## ProTrainer 5™ Software for Windows

Completing the RS800 Training System, Polar ProTrainer 5 professional training software for Windows allows you or your coach to easily design and analyse training sessions based on: heart rate zones, speed, distance, time and increasing/decreasing heart rate.

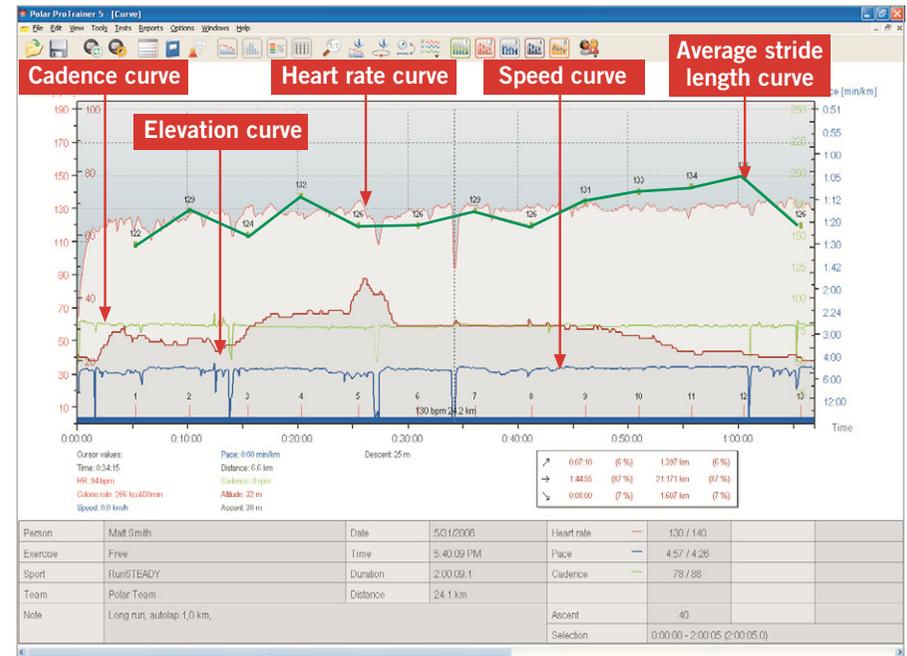
Through wire free (IrDA) communication you can personalize settings on the wrist unit, upload up to 21 date time activated training programs and, download exercise files from the wrist unit for detailed tracking and analysis.

### ProTrainer 5 enables you to:

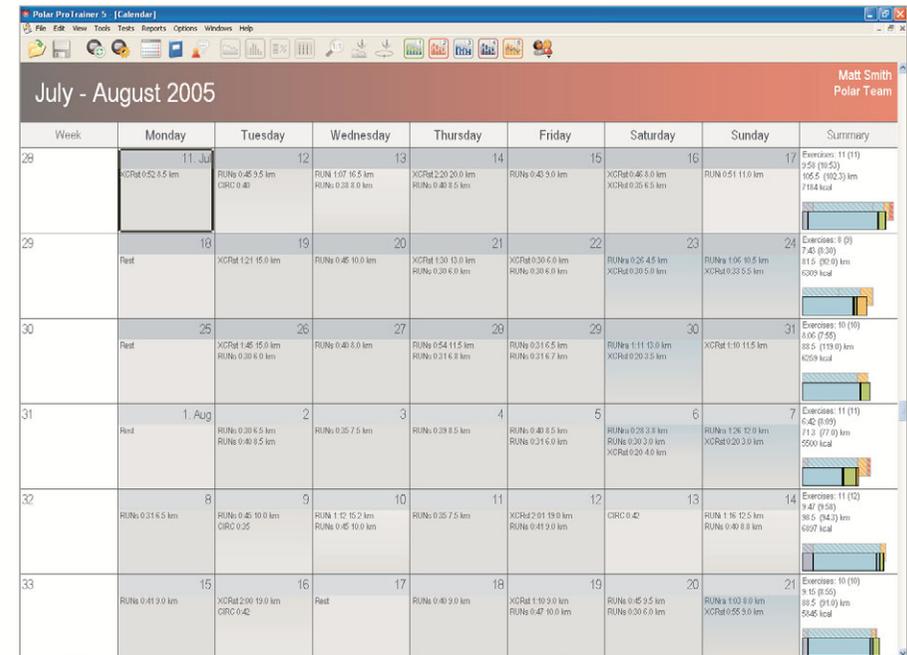
- Plan an unlimited amount of dynamic training sessions (transferable to the wrist unit 21 workouts at a time).
- Share training plans and exercise files over email
- Easily compare results vs. targets.
- Analyse at a glance with intuitive graph views
- Create a multitude of insightful reports for tracking training trends and for post-season analysis.

### Minimum System Requirements

- Windows® 2000/XP (32bit)
- IrDA compatible port (an external IrDA device or an internal IR port)
- Pentium II 200 MHz processor or faster
- SVGA or higher resolution monitor
- 20 MB hard-disk space



With Polar ProTrainer 5, you can analyse your training sessions based on: heart rate zones, speed, distance, time and increasing/ decreasing heart rate.



Polar ProTrainer 5 is a professional tool for training planning





## Optimising Training Effect With the RS800

When you train or workout you are over stressing your body. After training your body enters a recovery phase during which it over-compensates for the training, resulting in improved strength and fitness - this damage and repair cycle is called training effect. If you train too hard and / or too often you don't allow your body sufficient time to recover in between training sessions, the compound result can be a negative gain.

By knowing your state of recovery from previous training sessions you can determine how hard, how long or whether to train at all on any particular day.

The unique package of features in the RS800 enables you to monitor your recovery, compare exertion levels (even across different sports) as well as find the optimal training intensity for your current physical state.

**Polar sport zones:**  
Use sport zones to guide intensity during the training session to achieve desired effect (hard to recovery).

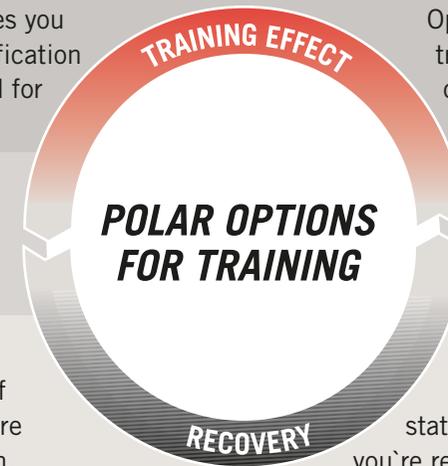
**Polar Exertion Count:**  
ProTrainer 5 provides you with a clear quantification of your training load for each workout.

**OwnOptimizer™:**  
Test the following day for level of training effect.

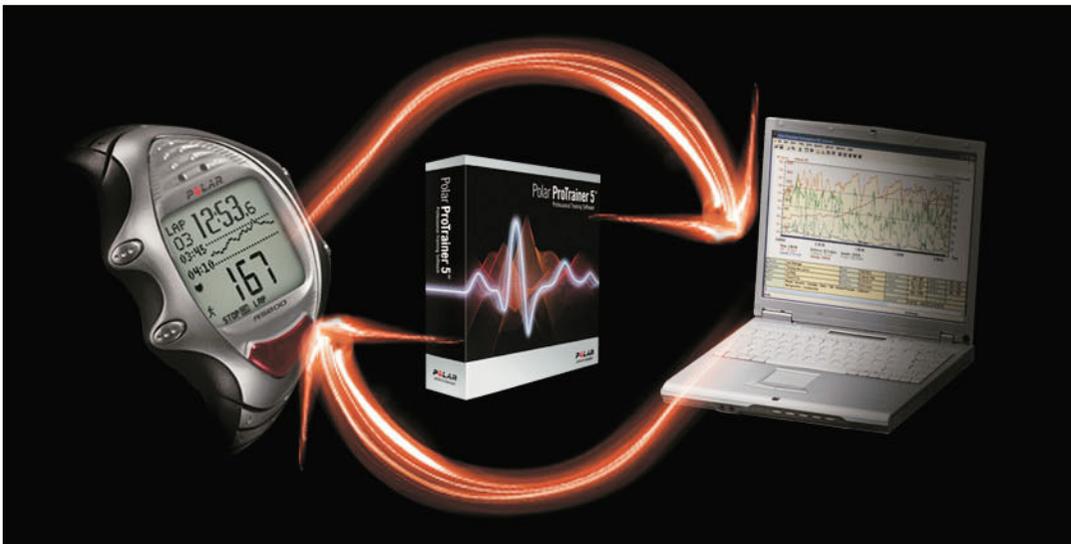
**R-R Intervals:**  
For a quick check of recovery status before next training session.

**OwnZone™:**  
Option for daily aerobic training zone based on current recovery level.

**OwnOptimizer™:**  
Check for recovery status to confirm whether you're ready for heavy training



- For active persons during regular training
- For elite level athletes during heavy training periodization phase



## PLAN – TRAIN – ANALYSE: USING THE POLAR RS800 TRAINING SYSTEM

### Plan your training program with ProTrainer 5

The program can be built up from an unlimited number of training sessions with each session comprising up to 12 phases with an unlimited amount of repetitions.

The duration of each training phase can be based on time, distance, increasing heart rate, decreasing heart rate or manually set during exercise (activate/deactivate through button push on the wrist unit). Phase intensity can be defined in Polar sport zones, as a percentage of maximum heart rate or left unspecified.

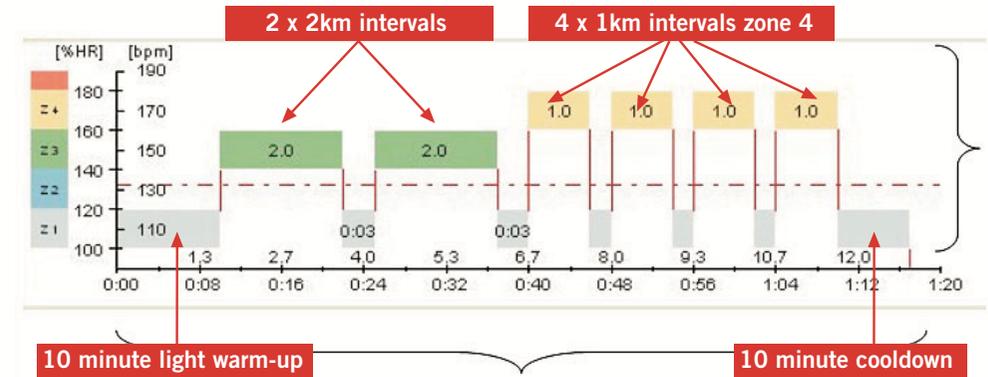
Transfer up to 21 pre-planned training sessions to the RS800 wrist unit via infra-red (IrDA) link. The RS800 sets a reminder alarm for the specified date and time of each session and configures itself automatically with the desired settings.

*NB: ProTrainer is very powerful and extremely configurable. To best experience what this software can do for your training planning download a free trial version from [www.polar.fi](http://www.polar.fi)*

### Create Training Programs Directly on the RS800

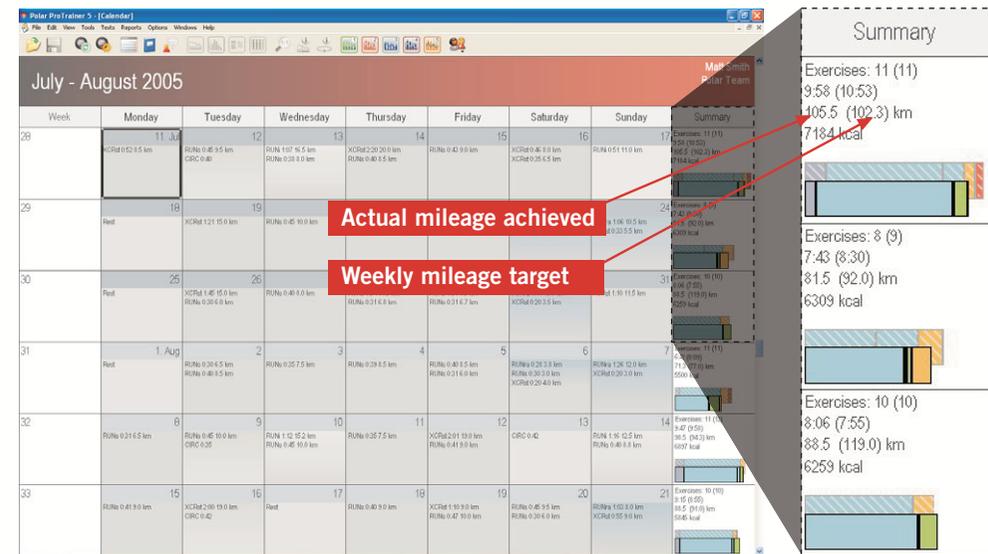
You can also use the RS800 in free exercise mode or create dynamic training sessions directly on the wrist computer with combinations of heart rate, speed, distance and timing parameters.

Intensity zones (heart rate) or speed zones (pace)



An example of a distance-based interval session created with the Polar ProTrainer 5 software.

### The power to compare targets vs. results



Polar ProTrainer 5 calendar view gives a snapshot view of your training plan month by month.



Display example 1	Display example 2	Display example 3
- Lap time	- Distance	- Distance
- Ascent	- Pace	- Cadence
- Heart rate	- Heart rate	- Pace

**PLAN – TRAIN – ANALYSE:  
USING THE POLAR RS800 TRAINING SYSTEM**

**The RS800 During Training**

During training there are up to 6 different display settings which can be scrolled through. Each display setting shows 3 pieces of information on separate rows. The information for each row is fully user configurable allowing the optimal combination of real time feedback. Furthermore, a zoom function for the top and middle rows provides maximum visibility of key information at the push of a button.

A zone alarm can be set to provide audible indication when training intensity is either above or below current phase target.

The file recording resolution can also be configured to either 1, 5, 15 or 60 seconds.

**Dynamic Training**

The RS800 features has a unique ZoneLock function which allows you to activate and deactivate target zones for intensity or speed with a single button push.

**Personalize the information to be displayed from the following choices:**

- R-R timing
- Heart Rate (BPM, % of max, % of HRR)
- Cadence <sup>1</sup>
- Speed / Pace (km/h, min/km) <sup>1</sup>
- Distance <sup>1</sup>
- Lap Distance <sup>1</sup>
- Current Altitude
- Ascent / Descent
- Calories burned
- ZonePointer / Zone Trend Graph (speed <sup>1</sup>, heart rate, Polar sport zone)
- Phase / Lap time
- StopWatch
- Time of day

<sup>1</sup> Optional s3 stride sensor is required.



**PLAN – TRAIN – ANALYSE:**  
**TOTAL LAP RECALL USING THE POLAR RS800 TRAINING SYSTEM**

**Post Training Analysis on the RS800**

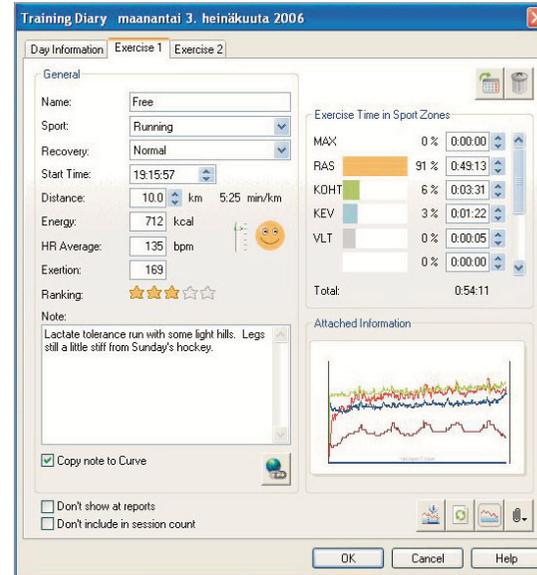
For quick analysis, you can review recorded data on the display of the RS800 immediately after training. The information available is as follows:

- Session start time
- Total session duration
- Total distance
- Speed / Pace – maximum and average
- Altitude – maximum, minimum and total ascent/descent.
- Total calories
- Running index
- Cadence – maximum and average.
- Average stride length
- Heart rate – maximum, minimum and average in BPM and as % of HR<sub>max</sub>
- Time spent in each sport zone

You can also review and compare this information for each exercise phase and lap time.

<b>LAP</b>	<b>1</b>	<b>2...99</b>
	Time	Time
	HR	HR
	Pace/ Speed	Pace/ Speed
	Distance	Distance
	Cadence	Cadence
	Stride length	Stride length
	Altitude	Altitude

RS800sd has a highly comprehensive lap information collection system. You can review the parameters of each lap taken during each run for up to 99 laps.



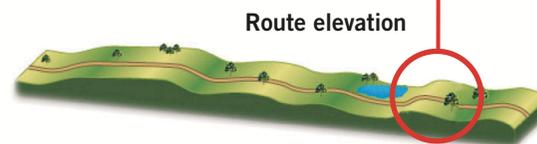
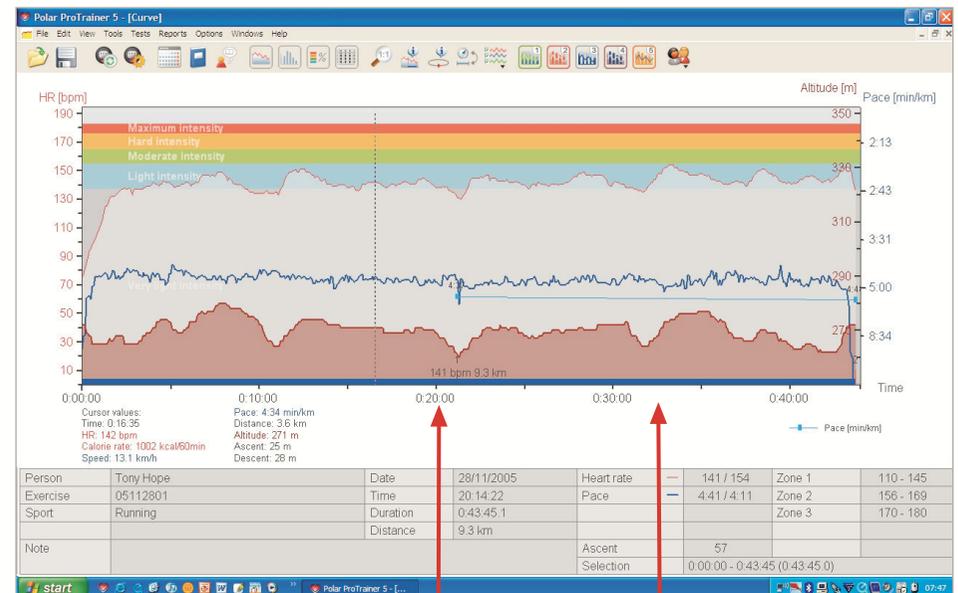
In ProTrainer 5 you can also add notes and 'day specific' information (weather conditions, amount of sleep, resting heart rate etc.) to the exercise file for future reference / remote analysis by your coach.

## PLAN – TRAIN – ANALYSE: USING THE POLAR RS800 TRAINING SYSTEM

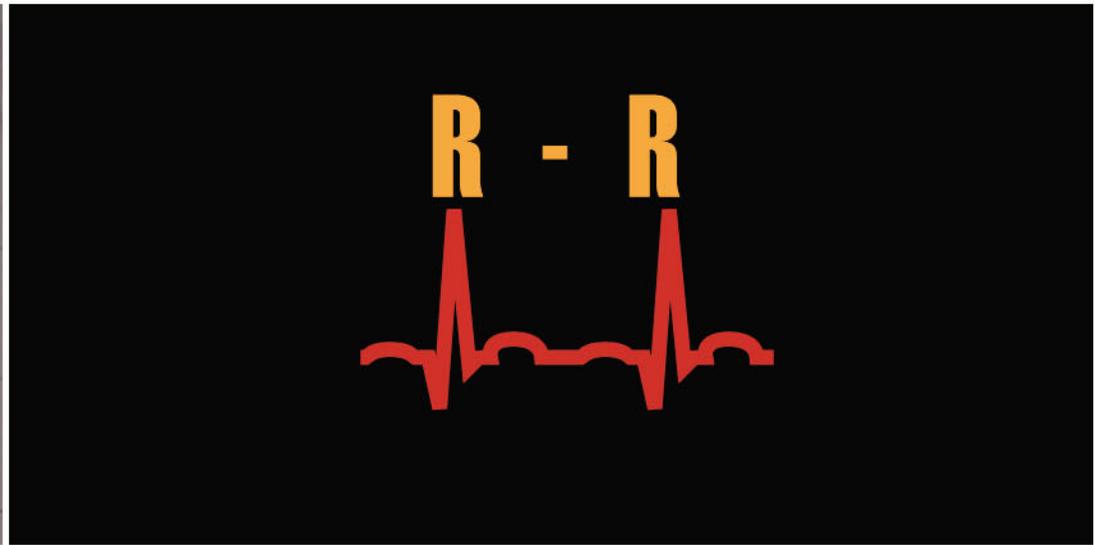
### Post Training Analysis in ProTrainer 5

Once the exercise file has been transferred to ProTrainer 5 software you can analyse every aspect of your training session in exacting detail.

Select any point during the training (data intervals depend on recording resolution selected – 1, 5, 15 or seconds) and you can quickly see time, heart rate, calorie rate, speed, pace, distance, cadence, altitude and ascent/descent. Information is also clearly displayed in a graphs enabling easy visual trend comparison between each data point, for example, heart rate vs. route elevation profile.



See your route elevation profile from every training session



### Measuring Heart Rate Variability – R-R Recording

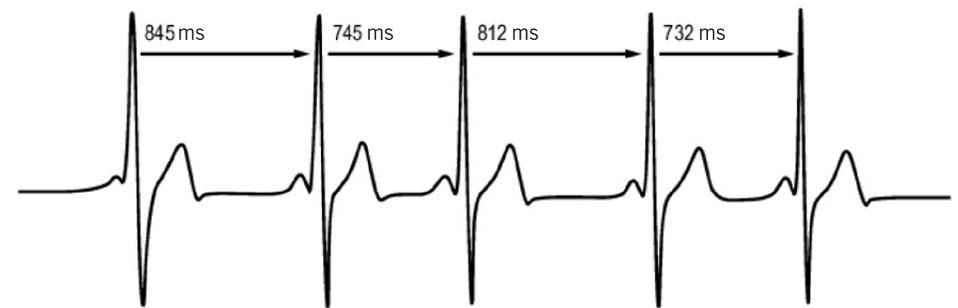
Heart rate varies with every heartbeat. Heart rate variability (HRV) is the timing between beats, also known as R-R intervals.

An average heart rate of 60 beats per minute (bpm) does not mean that the interval between successive heartbeats would be exactly 1.0 sec, instead they may fluctuate/vary from 0.5 sec up to 2.0 sec.

HRV is affected by aerobic fitness and is generally large at rest for a well conditioned heart. Other factors that affect HRV are age, genetics, body position, time of day, and health status. During exercise, HRV decreases as heart rate and exercise intensity increase. HRV also decreases during periods of mental stress.

HRV is regulated by the autonomic nervous system. Parasympathetic activity decreases heart rate and increases HRV, whereas sympathetic activity increases heart rate and decreases HRV.

HRV is used in the OwnZone®, OwnIndex®, and in OwnOptimizer™ features. It can also be monitored on its own using the RS800. If your HRV changes at a given running pace and heart rate, this may indicate a change in your training load and stress.



Variation in milliseconds between each heartbeat.



RS800 shows SD1 timing in real-time

SD1 is the mean time difference between maximum & minimum heart beat intervals.



Resting Heart Rate. High variability.



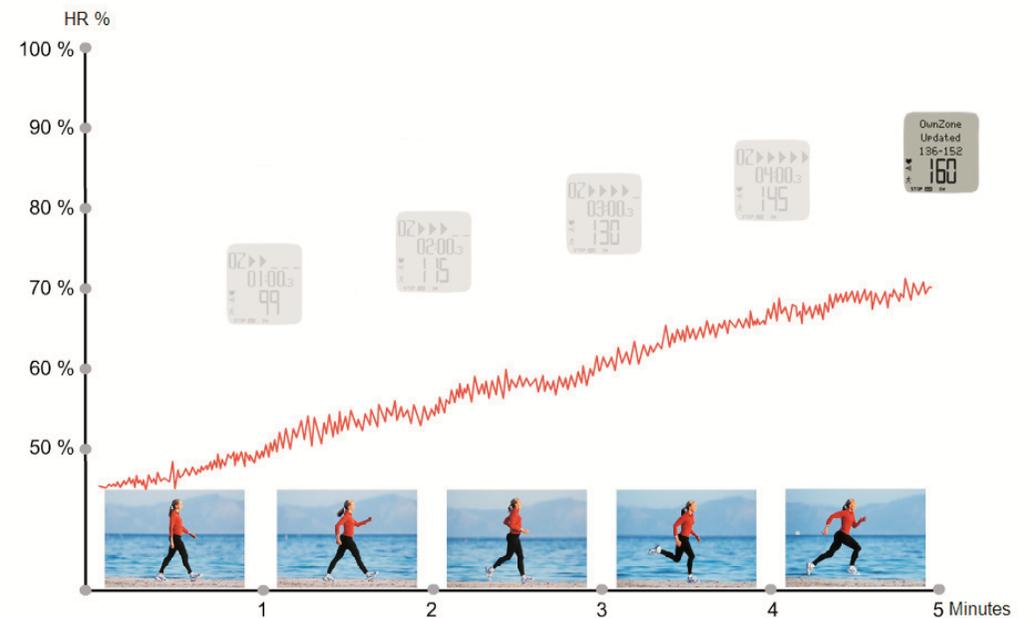
Aerobic Training. Less than 3ms SD1.

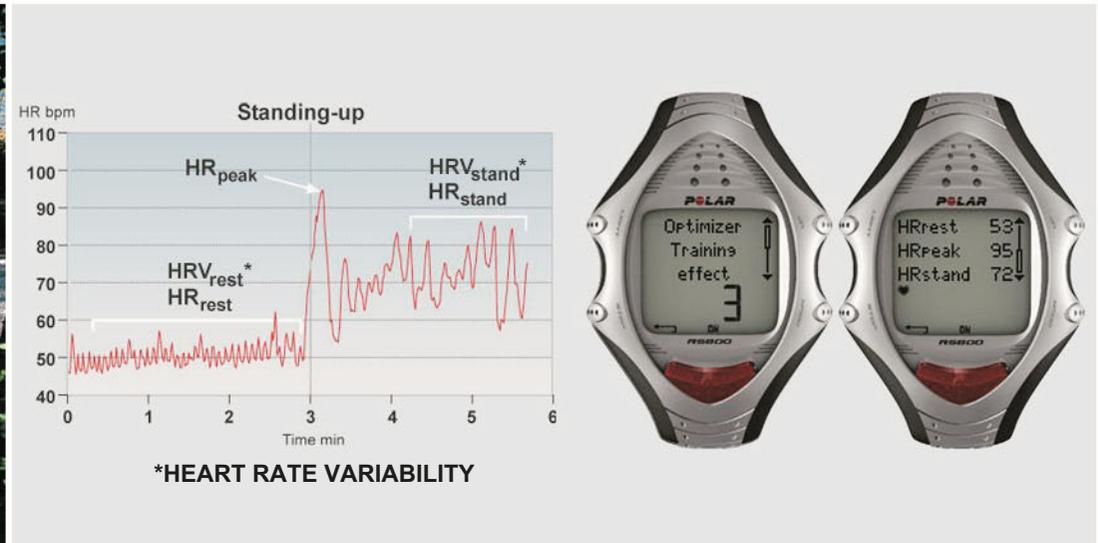
### OwnZone®

When you exercise your heart rate increases and the variability timing between beats decreases. Polar's research has identified that the point where the timing difference plateaus (i.e. becomes too negligible to measure) is the point where your aerobic training becomes effective.

From a controlled warm-up, the OwnZone feature identifies the point where variability plateaus and then defines the correct aerobic training zone for you. The benefit of this real-time measurement is that it matches your training intensity with your daily physical condition, compensating for effects such as: training load vs. recovery, stress, tiredness and even the on-set of illness.

Training dynamically with OwnZone enables you to optimally balance effort vs. effect.





## OwnOptimizer™

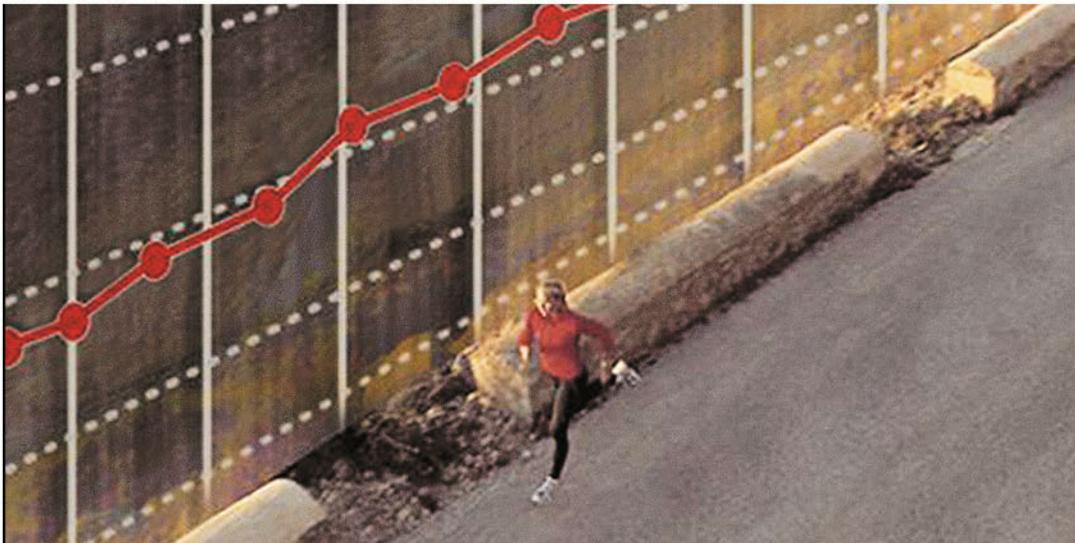
Successful training requires temporary overloading: longer exercise duration, higher intensity and frequency, or higher total volume. However, if you overload too much the effect to overall performance gains can be negative. To avoid this, overloading must always be followed by an adequate recovery period.

Polar OwnOptimizer measures heart rate and beat to beat variability during a simple orthostatic (laying down to standing) test. In this way it is able to identify the level of your training status and recovery, helping you to obtain optimal longer term performance benefits by ensuring you don't over or under train.

OwnOptimizer values range from 1 (Good Recovery) to 9 (Parasympathetic Overtraining). Using OwnOptimizer minimizes the risk of negative progression through excessive overtraining.



By testing yourself in the morning after a training session and after recovery days you are able to determine your level of recovery and adjust training intensities accordingly



## Running Index

Combining aerobic fitness ( $VO_{2max}$ ) and exercise economy (how efficient your body is at running), Running Index offers an easy way to measure performance (how fast/easily you run at a given pace).

By recording your Running Index over time, you can monitor progress. Improvement means that running at a given pace requires less of an effort, or that your pace is faster at a given level of exertion.

You can improve your Running Index results by improving your fitness level and running technique.

Running Index tells you more about your performance level because, unlike a  $VO_{2max}$  test, it factors in running technique. It is the equivalent to performing a Cooper test every run!

Running Index	Cooper test (m)	5 km (h:mm:ss)	10 km (h:mm:ss)	21.098 km (h:mm:ss)	42.195 km (h:mm:ss)
36	2000	0:35:00	1:11:30	2:34:00	5:20:00
38	2100	0:32:30	1:06:30	2:24:00	5:00:00
40	2200	0:30:45	1:03:00	2:16:00	4:45:00
42	2300	0:29:00	0:59:30	2:09:00	4:30:00
44	2400	0:28:00	0:57:30	2:04:00	4:20:00
46	2500	0:26:45	0:55:00	1:59:00	4:10:00
48	2600	0:25:30	0:52:30	1:54:00	4:00:00
50	2700	0:24:15	0:50:00	1:49:00	3:50:00
52	2850	0:23:15	0:48:00	1:44:00	3:40:00
54	2950	0:22:15	0:46:00	1:40:00	3:32:00
56	3100	0:21:15	0:44:00	1:36:00	3:25:00
58	3200	0:20:30	0:42:30	1:33:00	3:18:00
60	3300	0:19:30	0:40:30	1:29:00	3:10:00
62	3400	0:19:00	0:39:30	1:26:00	3:05:00
64	3500	0:18:30	0:38:30	1:24:00	3:00:00
66	3650	0:17:45	0:37:00	1:21:00	2:55:00
68	3750	0:17:15	0:36:00	1:19:00	2:50:00
70	3900	0:16:30	0:34:30	1:16:00	2:45:00
72	4000	0:16:00	0:33:30	1:14:00	2:40:00
74	4100	0:15:30	0:32:30	1:12:00	2:35:00
76	4200	0:15:15	0:32:00	1:10:00	2:30:00



## Running Cadence and Stride Length

Cadence is the number of times the foot with the stride sensor hits the ground per minute. Stride length is the average length of one step.

There are two ways to run faster: moving your legs at a higher cadence or taking longer steps. Elite long distance runners typically run with a high cadence of 85-95. On uphill, typical cadence values are lower. On downhill they are higher. Runners adjust stride length to gather speed: stride length increases as speed increases.

A common problem for less experienced runners is a low cadence caused by over striding, the result of this is braking against forward motion with each step - Not a good idea!. By focusing on leg speed as part of your training plan you can easily improve your overall technique and benefit from greater running efficiency.

For more information on Running Cadence and Stride Length please visit the Polar Article Library <http://articles.polar.fi/en/main.html>

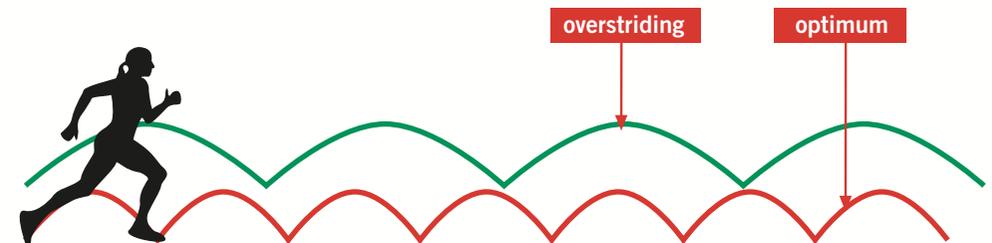
## Recommended Cadence vs. Height

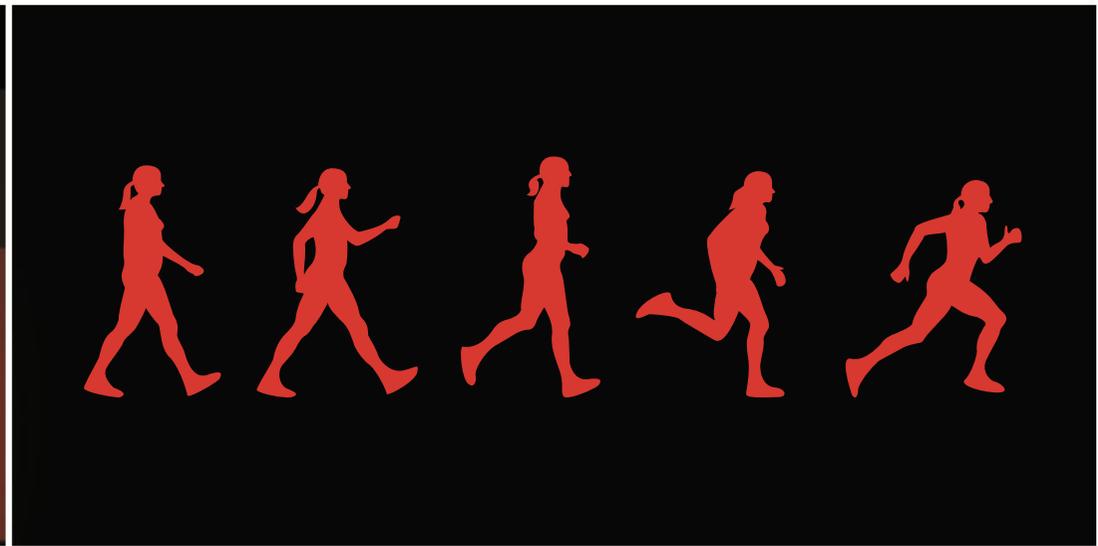
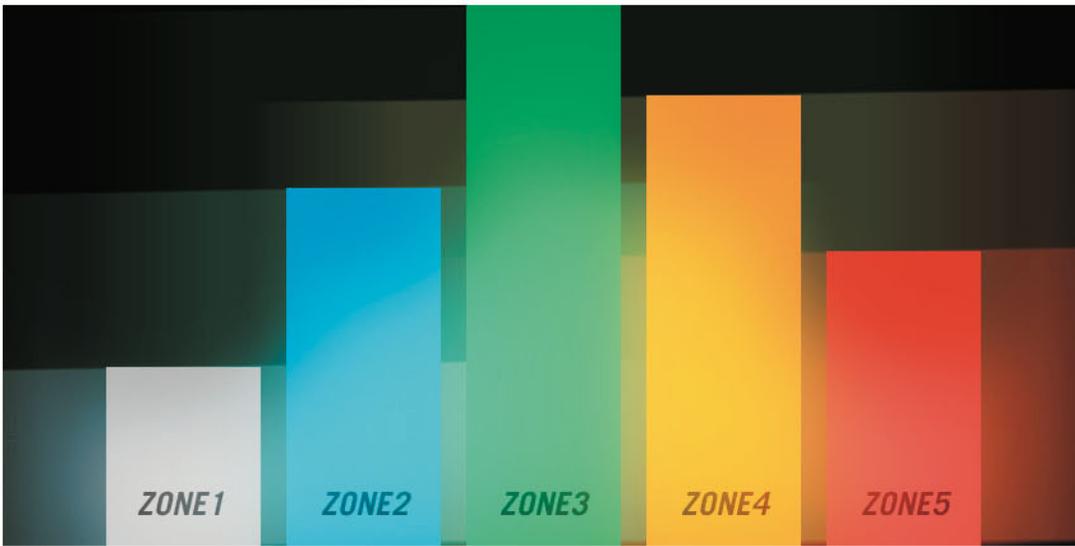
Marathon time	4hours	3.5hours	3hours	2.75hours
Pace	5:42/km	5:00/km	4:17/km	3:55/km
Height				
190cm	84-86	86-88	88-90	90-92
180cm	86-88	88-90	90-92	92-94
170cm	88-90	90-92	92-94	94-96
160cm	90-92	92-94	94-96	96-98

Stride length = the distance of a stride.



Cadence = number of strides per time unit.

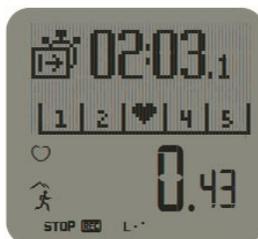




Target zone	Intensity % of HR <sub>max</sub> , bpm	Example interval durations	Training benefit
<b>5</b> <b>MAXIMUM</b> 	90–100% 171–190 bpm	less than 5 minute	<b>Benefits:</b> Maximal or near maximal effort for breathing and muscles <b>Feels like:</b> Very exhausting for breathing and muscles <b>Recommended for:</b> Very experienced and fit runners. Short intervals only, usually in final preparation for short running events
<b>4</b> <b>HARD</b> 	80–90% 152–171 bpm	2–10 minutes	<b>Benefits:</b> Increased ability to sustain high speed endurance <b>Feels like:</b> Muscular fatigue and heavy breathing <b>Recommended for:</b> Experienced runners for all year round training varying in length. Becomes more important during pre competition season
<b>3</b> <b>MODERATE</b> 	70–80% 133–152 bpm	10–40 minutes	<b>Benefits:</b> Enhances general training pace, makes Moderate intensity efforts easier and improves efficiency <b>Feels like:</b> Steady controlled fast breathing <b>Recommended for:</b> Runners progressing towards events or looking for performance gains, particularly for half and full marathon training
<b>2</b> <b>LIGHT</b> 	60–70% 114–133 bpm	40–80 minutes	<b>Benefits:</b> Improves general base fitness, improves recovery and boosts metabolism <b>Feels like:</b> Comfortable and easy, low muscle and cardiovascular load <b>Recommended for:</b> Everybody for long training sessions during base training periods and for recovery exercises during competition season
<b>1</b> <b>VERY LIGHT</b> 	50–60% 104–114 bpm	20–40 minutes	<b>Benefits:</b> Helps to warm up and cool down and assists recovery <b>Feels like:</b> Very easy, little strain <b>Recommended for:</b> For recovery and cool-down exercises throughout the training season

### Sport Zones

Polar sport zones introduce a new level of ease in heart rate-based training. Training is divided into five sport zones based on percentages of maximum heart rate. With sport zones, you can easily select and monitor training intensities to achieve optimal results.



RS800 screen shot current Sport Zone

After exercise, time spent in each sport zone is displayed. Use the weekly display to see in which sport zones you have been exercising, and the duration spent in each sport zone.